CLAIMS

What is claimed is:

1. A recording medium comprising:

land tracks; and

groove tracks;

wherein the land tracks and the groove tracks are wobbled, and the wobbles of groove tracks or individual land tracks are which are a first type of track are out of phase with the wobbles of the next other type of track and the wobbles of the other type of tracks are in phase with the wobbles of the next first type of tracks.

2. The recording medium according to claim 1, wherein the wobbles formed on one of the groove tracks have a phase difference of π with the wobbles of the very next groove track in a radial direction of the recording medium, and the wobbles formed on one of the land tracks have a phase difference of π with the wobbles of the very next land track in the radial direction.

3. The recording medium according to claim 1, wherein the wobbles of the groove tracks are out of phase with the wobbles of the next land tracks and the wobbles of the land tracks are in phase with the wobbles of the next groove tracks.

4. The recording medium according to claim 3, wherein the wobbles of the groove tracks have a phase difference of π with the wobbles of the next land tracks.

5. The recording medium according to claim 1, wherein the wobbles of the land tracks are out of phase with the wobbles of the next groove tracks and the wobbles of the groove tracks are in phase with the wobbles of the next land tracks.

6. The recording medium according to claim 5, wherein the wobbles of the land tracks have a phase difference of π with the wobbles of the next groove tracks.

7. The recording medium according to claim 1, further comprising physical identifier headers which store track numbers and sector numbers and are prepitted in centers of corresponding ones of the land tracks and groove tracks.

8. The recording medium according to claim 1, further comprising physical identifier headers which store track numbers and sector numbers and are shifted from centers of corresponding ones of the land tracks to then be prepitted.

9. A recording medium groove tracks comprising:

land tracks; and

groove tracks;

wherein the land tracks and the groove tracks are wobbled, and the wobbles of the groove tracks and the land tracks are out of phase with the wobbles of the next other types of tracks.

10. The recording medium according to claim 9, wherein the wobbles formed of the land tracks and the groove tracks have a phase difference of π with the wobbles of the next other types of tracks.

11. The recording medium according to claim 9, further comprising physical identifier headers which store track numbers and sector numbers and are prepitted in centers of corresponding ones of the land tracks and groove tracks.

12. The recording medium according to claim 9, further comprising physical identifier headers which store track numbers and sector numbers and are shifted from centers of corresponding ones of the land tracks and groove tracks to then be prepitted.

13. A servo controller in an optical recording and/or reproducing apparatus having a pickup unit for tracking an optical recording medium having groove tracks and land tracks, the servo controller comprising:

a photo detector to output as two channels a light signal reflected from the optical recording medium in which wobbles of the groove tracks or the land tracks which are a first type of tracks are out of phase with the wobbles of the next other type of tracks and the wobbles of the other type of tracks are in phase with the wobbles of the next first type of tracks, or the wobbles of the groove tracks and the land tracks are out of phase with the wobbles of the next other types of tracks;

a wobble signal detector to detect a wobble signal from at least one of the two channels;

a wobble signal determiner to determine whether one of the tracks, which is currently tracked by the pickup unit, is a groove track or a land track, and to provide a determination signal; and

a controller to generate a control signal for controlling a servo for moving the pickup unit using the determination signal and the detected wobble signal.

14. The servo controller according to claim 13, wherein:

the photo detector divides the light signal into two signals; and

if the wobbles of the individual land tracks and the individual groove tracks are out of phase with the wobbles of the next other types of tracks, the wobble signal detector detects a groove wobble signal and a land wobble signal from a first one of the two channels corresponding to the sum of the two signals output from the photo detector, the detected groove wobble signal and the land wobble signal being out of phase with respect to each other.

15. The servo controller according to claim 13, wherein:

the photodetector divides the light signal into two signals; and

if the wobbles of the groove tracks have a phase difference of π with the wobbles of the next land tracks, the wobbles of the land tracks are in phase with the next groove tracks, the

wobbles formed on one of the groove tracks have a phase difference of π with the wobbles of a very next groove track in a radial direction of the recording medium, and if the wobbles formed on one of the land tracks have a phase difference of π with the wobbles of a very next land track in the radial direction, the wobble signal detector detects a groove wobble signal from a first one of the two channels corresponding to a difference between the two signals output from the photo detector and the wobble signal detector detects a land wobble signal from a second one of the two channels corresponding to a sum of the two signals output from the photo detector.

16. The servo controller according to claim 15, wherein the controller detects positions of the land tracks and the groove tracks and detects whether a corresponding land or groove track number is an odd number or an even number, according to the determination signal and the groove and land wobble signals.

17. The servo controller according to claim 13, wherein:

the photo detector divides the light signal into two signals; and

if the wobbles of the land tracks have a phase difference of π with the wobbles of the next groove tracks, the wobbles of the groove tracks are in phase with the wobbles of the next land tracks, the wobbles formed on one of the groove tracks have a phase difference of π with the wobbles of a very next groove track in a radial direction of the recording medium, and if the wobbles formed on one of the land tracks have a phase difference of π with the wobbles of a very next land track in the radial direction, the wobble signal detector detects a land wobble signal from a first one of the two channels corresponding to a difference between the two signals output from the photo detector and the wobble signal detector detects a groove wobble signal from a second one of the two channels corresponding to a sum of the two signals output from the photo detector.

18. The servo controller according to claim 17, wherein the controller detects positions of the land tracks and the groove tracks and detects whether a corresponding land or groove track number is an odd number or an even number, according to the determination signal and the groove and land wobble signals.

19. A servo controlling method for an optical recording and/or reproducing apparatus having a pickup unit for tracking an optical recording medium, comprising:

(a) outputting as two channels a light signal reflected from the optical recording medium in which wobbles of groove tracks or land tracks of the recording medium which are a first type of track are out of phase with the wobbles of the next other type of tracks and the wobbles of the other type of tracks are in phase with the wobbles of the next first type of tracks, or the wobbles of the groove tracks and the land tracks are out of phase with the wobbles of the next other types of tracks;

(b) detecting a wobble signal from at least one of the two channels;

(c) determining whether one of the tracks which is currently tracked by the pickup unit, is a groove track or a land track to provide a determination signal; and

(d) controlling a servo for moving the pickup unit using the determination signal and the detected wobble signal.

20. The method according to claim 19, wherein if the wobbles of the land tracks and the groove tracks are out of phase with the wobbles of the next other types of tracks, in the step (b), detecting a groove wobble signal and a land wobble signal from a first one of the two channels corresponding to a sum of two signals output from the photo detector, the detected groove wobble signal and the land wobble signal being out of phase with respect to each other.

21. The method according to claim 19, further comprising:

dividing the light signal into two signals;

wherein if the wobbles of the groove tracks have a phase difference of π with the wobbles of the next land tracks, the wobbles of the land tracks are in phase with the wobbles of

the next groove tracks, the wobbles formed on one of the groove tracks have a phase difference of π with the wobbles of a very next groove track in a radial direction of the recording medium, and if the wobbles formed on one of the land tracks have a phase difference of π with the wobbles of a very next land track in the radial direction, in the step (b), detecting a groove wobble signal from a first one of the two channels corresponding to a difference between the two signals and detecting a land wobble signal from a second one of the channels corresponding to a sum of the two signals.

22. The method according to claim 21, further comprising (e) detecting positions of the land tracks and the groove tracks and detecting whether a corresponding groove or land track number is an odd number or an even number according to the determination signal and the groove and land wobble signals.

23. The method according to claim 19, further comprising:

dividing the light signal into two signals;

wherein if the wobbles of the land tracks have a phase difference of π with the wobbles of the next groove tracks, the wobbles of the groove tracks are in phase with the wobbles of the next land tracks, the wobbles formed on one of the land tracks have a phase difference of π with the wobbles of a very next land track in a radial direction of the recording medium, and if the wobbles formed on one of the groove tracks have a phase difference of π with the wobbles of a very next groove track in the radial direction, in the step (b), detecting a land wobble signal from a first one of the two channels corresponding to a difference between the two signals and detecting a groove wobble signal from a second one of the two channels corresponding to a sum of the two signals.

24. The method according to claim 23, further comprising (e) detecting positions of the land tracks and the groove tracks and detecting whether a corresponding groove or land track number is an odd number or an even number according to the determination signal and the groove and land wobble signals.

25. A recording medium comprising:

land tracks; and

groove tracks;

wherein the land tracks and groove tracks are wobbled, and the groove tracks have a same frequency as and are out of phase with the land tracks.

26. The recording medium according to claim 25, wherein the wobbles of the groove tracks or individual land tracks which are a first type of tracks are out of phase with the wobbles of the next other type of tracks and the wobbles of the other type of tracks are in phase with the wobbles of the next first type of tracks.